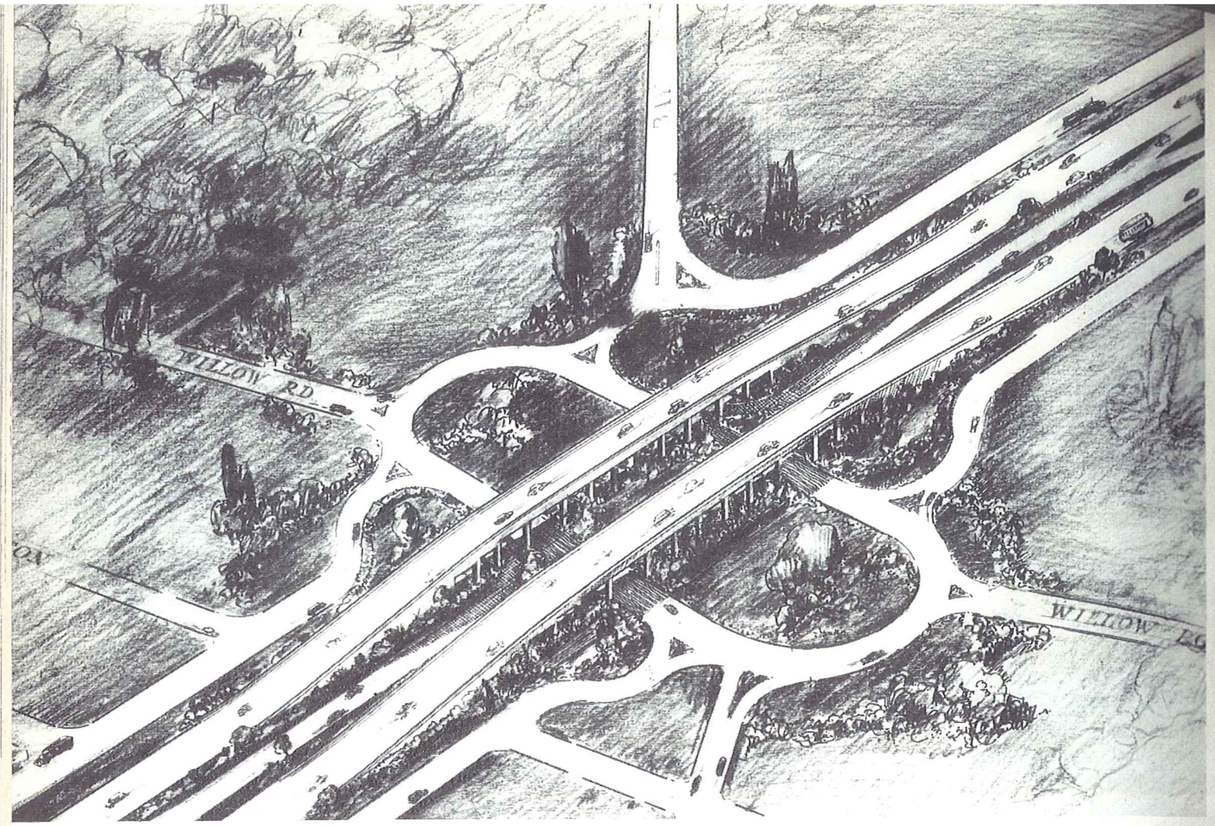


Engineers drawing of plan for carrying Bayshore through traffic on two separated overpasses at Willow Road intersection in Palo Alto with outside lanes for local traffic and safe access lanes to freeway.

Bayshore Freeway Plans Shown

By LAWRENCE BARRETT, Chairman Highway Commission

DUE TO the phenomenal growth of the San Francisco peninsula area, it is imperative that the State undertake as soon as possible the conversion, by stage construction, of the present Bayshore Highway between San Francisco and Palo Alto into a freeway, with six lanes divided by a median strip for high speed traffic and the construction of twenty-five overheads, underpasses, and major structures, which will eliminate all intersections on this route.

Director of Public Works Frank W. Clark presented a report covering every detail of the proposed project to the California Highway Commission in session in San Mateo on July 26th.

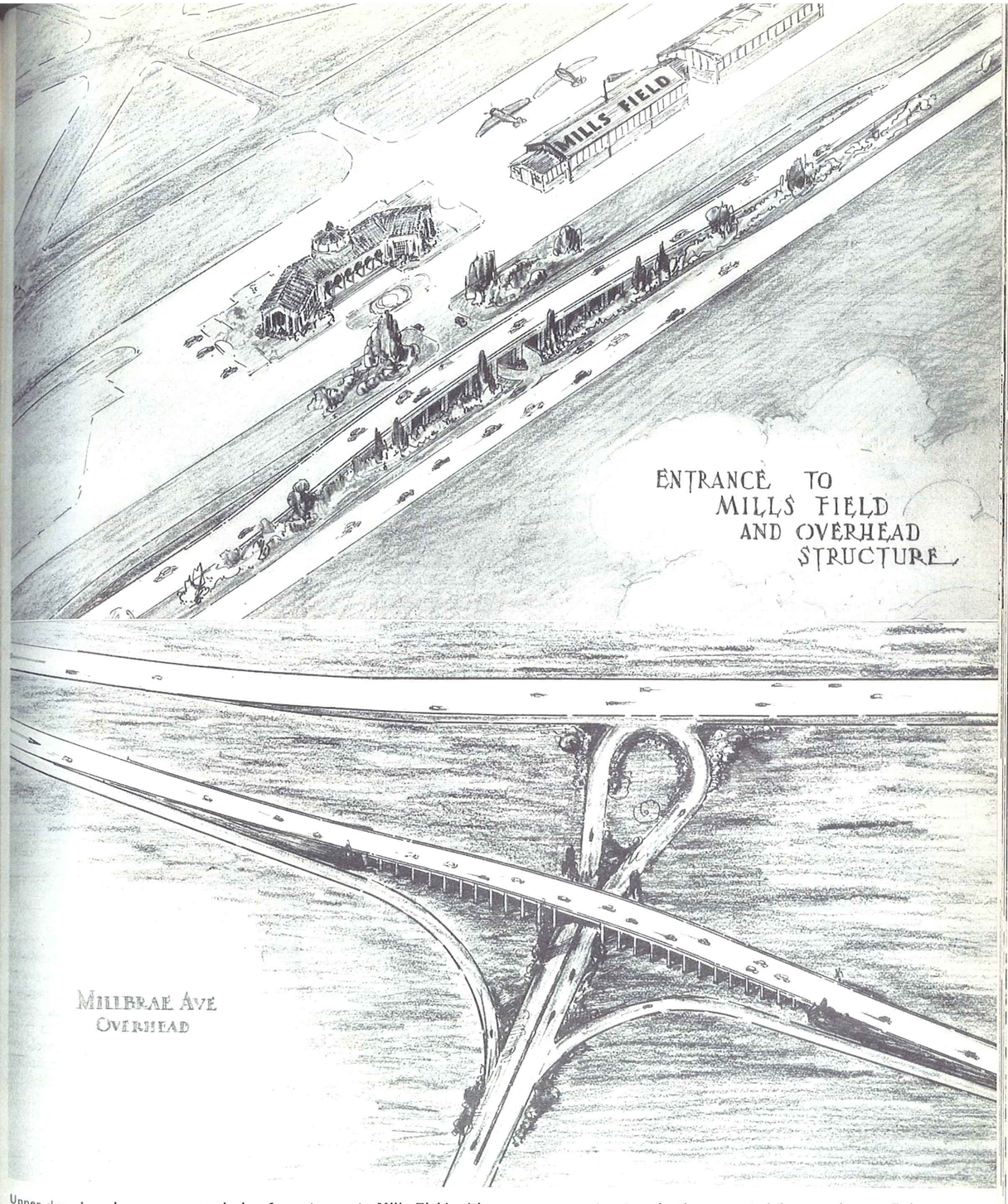
The report was prepared by State Highway Engineer C. H. Purcell and Colonel Jno. H. Skeggs, District Engineer. Director Clark made the following statement relative to the State's plan of converting the Bayshore Highway into a freeway:

"In view of the increasing traffic congestion problems in our metropolitan areas, Governor Olson and the California Highway Commission are of the opinion that the logical solution of these problems in our largest cities is the construction of high-speed freeways such as the Arroyo Seco project now nearing completion between Los Angeles and Pasadena, and this proposed freeway between San Francisco and Palo Alto.

LONG RANGE PROGRAM

"Such undertakings involve the expenditure of large sums of highway funds, and necessarily must be built in sections under a long-range program. The present State administration is committed to a policy of assisting cities to solve their traffic congestion problems, and Governor Olson is greatly interested in having the Bayshore Freeway started as soon as moneys required may be provided for in the next biennial highway budget.

"The Arroyo Seco is the first free-



Upper drawing shows a proposed plan for entrance to Mills Field with one overpass structure in the separated freeway lanes. Below, Millbrae Avenue intersection showing existing highway separated by 40-foot division strip from new overhead with approach roads to both lanes.

way undertaken by the Highway Commission, and the Bayshore Freeway will be the first project of its kind in Northern California.

"In establishing the freeway principle on the Bayshore Highway the State will be able to conserve the full original investment in this route which is susceptible of expansion with a minimum of conflict with residential and property improvements."

State Highway Engineer Purcell's report pointed out that traffic from the San Francisco - Oakland Bay Bridge, from the Golden Gate Bridge, and the East Bay District, in addition to traffic from San Francisco, now pours onto the Bayshore Highway, which is inadequate to handle the ever-increasing traffic. In less than ten years Mr. Purcell believes that both the El Camino Real and the Bayshore Highway will be carrying capacity traffic.

TENTATIVE PLANS SUBMITTED

In his report to the Commission Director Clark submitted tentative plans and drawings for the contemplated freeway, extending from the vicinity of Third Street in San Francisco to the Embarcadero Road-Oregon Avenue intersection in East Palo Alto, a distance of some 27 miles. The first unit of the project will be from the South San Francisco Underpass to and including Broadway in Burlingame, at an approximate cost of $2,300,000.

The Bayshore Highway, from the San Francisco City and County line through San Mateo County, was added to the State Highway System by legislative enactment in 1923 and construction of the first unit of the existing highway between South San Francisco and Burlingame, a distance of 5¾ miles, was started in September, 1924, and since that date one unit has been completed during each biennial period, until up to the present time the last section is ready for use by the motoring public.

"Over this sixteen-year period of construction," Director Clark said, "the daily traffic on this route has increased from nothing to a present volume of some 30,000 motor vehicles of all types. As a consequence, that portion of this highway between San Francisco and Palo Alto should be progressively expanded and modernized, not only to adequately handle present-day traffic, but to care for the traffic increase which will soon overtax the present improvement.

"The Bayshore Highway has developed into one of the most important main trunk highways of our State for commercial vehicles and through traffic destined for the southerly sections of the State. Its proximity to the San Francisco Airport, at Mills Field, and Moffet Field at Sunnyvale, emphasizes its importance for national defense. It has assumed greatest importance, however, in serving to accommodate an ever-increasing volume of fast, or express commuter-type of traffic, between the focal business area of San Francisco and the residential urban areas on the peninsula."

Director Clark hands proposed Bayshore Freeway report to Chairman Barrett.

Director Clark submitted to the Commission a report from State Highway Engineer Purcell, which revealed, that compared with the State-wide average of 1.4 accidents per million vehicle miles, the rate of the Bayshore Highway was 2.9, or slightly more than twice the general average. The report said that conversion of the Bayshore Highway into a freeway should eliminate or greatly reduce head-on, intersection, pedestrian, and "U"-turn accidents.

The Bayshore Highway throughout San Mateo County, compared with other four-lane highways in the State, ranks as one of the highest in accident rate per million vehicle miles traveled. During 1939 there were 276 accidents on this section, involving 19 fatalities and 235 injuries. Using a conservative figure of $5,000 per fatality, $300 per injury, and $50 per accident for property damage, it is apparent that there was an economic loss of $179,300 during 1939 due to accidents on this stretch of highway.

ONLY FEASIBLE FREEWAY

The Peninsula Area in general, and San Mateo County in particular, must be considered as a part of greater San Francisco. Due to the topography, the number of main arterials serving this area is limited and the Bayshore Highway offers the only route lending its expansion into a freeway.

The freeway portion, or interlanes, of the proposed new highway have been designed 12-11-12 feet in width, a total of 35 feet on either side of the central division strip—thus providing a six-lane freeway. Acceleration and deceleration lanes, in addition to the 35-foot width, of the 11-foot width, and sufficient length to properly decelerate or accelerate to design speeds, have been provided.

The magnitude of this project in its entirety is such that it will require all funds which can be made available by the State, various incorporated cities and towns, and the counties, in addition to such federal aid as may be obtained.

"In addition to financing the initial construction on portions in San Mateo County" said Mr. Clark, "some assistance from all public bodies interested may be necessary to produce the Bayshore Freeway as an accomplished project. It is hoped this result can be obtained by 1950 or sooner."

101 PER CENT INCREASE

In his report Highway Engineer Purcell said that the combined traffic on the Bayshore Highway and El Camino Real, serving the potential population area of the Peninsula in the period 1928 to 1939, has increased 44 per cent on Sundays and 101 per cent on Mondays.

The proposed freeway, 27 miles in length, starts with a grade separation at Third Street in San Francisco, proceeding with a new and direct freeway location to Sierra Point, thence expanding on the east side through San Francisco, thence by revisions on both sides to south of Broadway, Burlingame, from which point on to the Embarcadero Intersection south of Palo Alto, widening on the east side of the existing alignment throughout, is recommended by Mr. Purcell.

Ultimately it is planned to plant trees and shrubs along the entire length of the dividing strip.

Moving pictures showing the broadly divided freeways or parkways of the metropolitan area of New York and on Long Island were exhibited to the Commission, showing the great advances in development of such arterials in the East.

The Commission heard delegations from the City and County of San Francisco; San Mateo; California State Automobile Association; San Francisco Chamber of Commerce and San Francisco Supervisors, all endorsing the proposed freeway expansion of the Bayshore Highway.

In behalf of the Highway Commission I can give assurance that under the present administration there will be set up in the coming budget, sufficient funds to start this program on the Bayshore Highway that will result in a highway of which we will all be proud. In the construction of this improvement consideration will be given to a freeway.

Realizing the importance of this highway we will set up a sum for the construction of a portion of the project looking forward to the full completion of it in the future.

While the cost of the improvement in its entirety will be tremendous, the saving of life and property and the relief of dangerous traffic conditions will fully justify any expenditure required to make the Bayshore Highway a modern, safe route. As a

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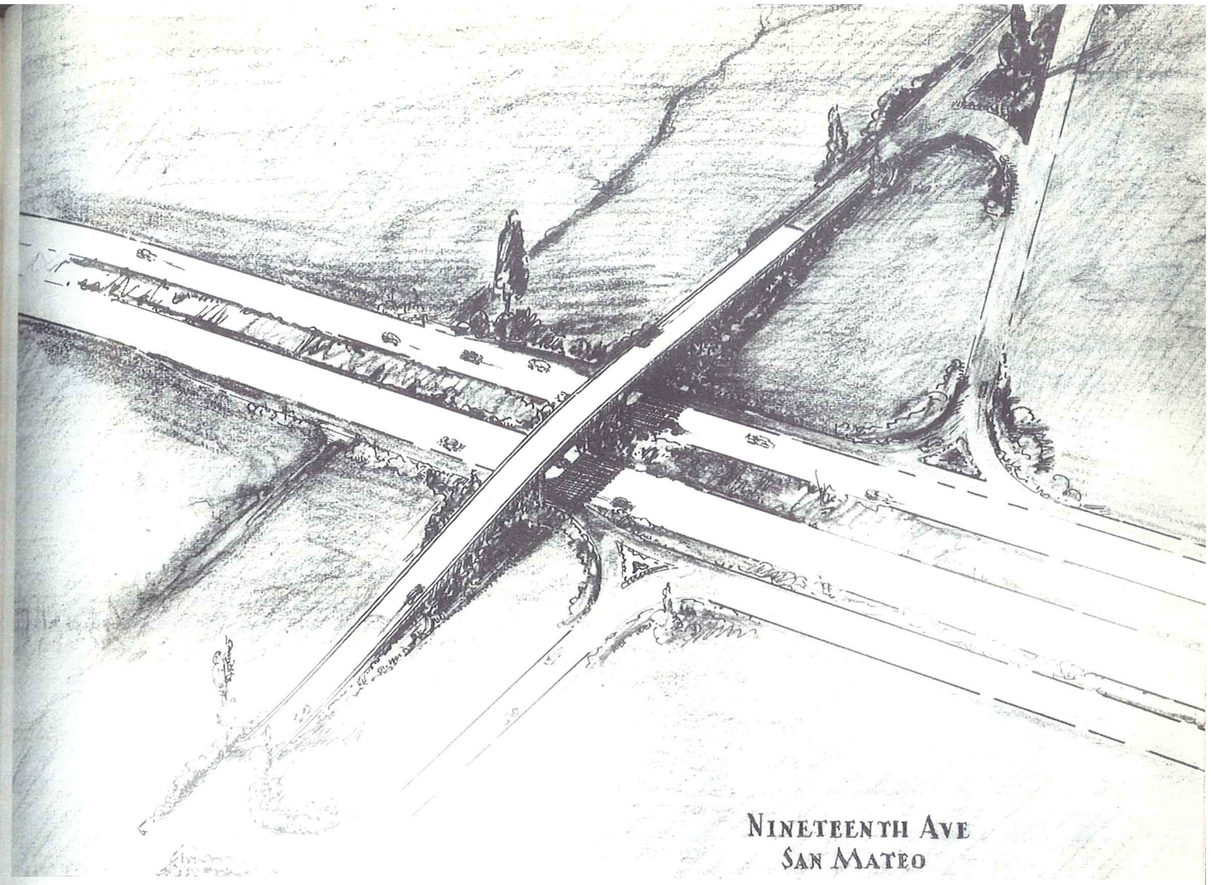


Proposed overpass at Nineteenth Avenue, San Mateo, crosses widely separated freeway lanes with curved approaches providing safe access to highway.

Engineering Details And Route Of Proposed Bayshore Freeway

By C. H. PURCELL, State Highway Engineer

IN sixteen years since the opening of the first section of the Bayshore Highway in 1924, traffic has increased from nothing to 30,000 vehicles per day, while traffic on El Camino Real, the original and only other peninsula highway, has remained nearly constant.

The Bayshore is an important trunk for through state and commercial traffic, and a key-route from the standpoint of national defense, but is most important in serving fast commuter-type traffic from the suburban peninsula area, which is a part of greater San Francisco. This commuter and week-day local traffic is most closely correlated to vehicle registrations of San Mateo County alone. Sunday traffic is affected more by the combined vehicle registrations of San Francisco, San Mateo and Santa Clara counties.

The combined traffic on State Highway Route 2 (El Camino Real) and 68 (Bayshore highway) serving the potential populated area of the peninsula in the period 1928-1939 has increased 44 per cent on Sundays and 100 per cent on Mondays. Forecasts of 15-hour daily traffic on the Bayshore Highway at the South San Francisco under-pass for 1950 is 43,000 for Sunday and 34,000 for Monday, with present facilities having a maximum capacity of 32,000 vehicles. For 1965 the traffic forecast is 50,000 and 41,000 respectively for Sundays and Mondays.

With expanded Bayshore facilities, with induced traffic, 16-hour daily Sunday volume is forecast at 46,000 for 1950 and 60,000 for 1965. Monday traffic forecast is 38,000 by 1950 and 55,000 by 1965. Mass transportation by bus, on the proposed freeway prior to 1965 should level off peak hour travel increasing generally accepted highway traffic 20 to 25 per cent week-day travel. Sunday travel during evening peak-hour by 1965 should flow uniformly on the freeway, but at modified speeds.

Capitalized reducible accidents on the Bayshore Highway in San Mateo County would justify an investment of one and one-half million dollars from that standpoint alone. The Bayshore is the logical and only route which can be expanded to freeway design due to topography and property improvements. All of the present capital investment can be conserved for public use.

A start should be made now toward expanding the Bayshore Highway to a six-lane freeway design. The first unit should be between the South San Francisco under-pass and Peninsula Avenue, near the cities of Burlingame and San Mateo.

The proposed route, 27 miles in length, starts with a grade separation at 3d Street in San Francisco, proceeding with a new and freeway location at Sierra Point, thence expanding on the east side through South San Francisco, thence by revisions on both sides to south of Broadway, Burlingame, from which point on to the Embarcadero intersection south of Palo Alto, widening on the east side of the existing alignment throughout is recommended.

Full cooperation of all incorporated cities, the county, the State and Federal government, will be required to start and prosecute this major San Francisco metropolitan highway project to successful conclusion in time to realize and insure the full economic benefits which it can bestow upon the community and the State.

The recommendations of the Division of Highways are as follows:

1. The reconstruction of the Bayshore to consist of a six-lane highway of the freeway type.

2. The highway to be declared a freeway from Third Street in San Francisco to Oregon-Embarcadero Road in Santa Clara County.

3. The 6.6 mile section from immediately south of South San Francisco Underpass, to and including Peninsula Avenue, Burlingame, to be started and proceed by stages as the first unit. Surveys and design to proceed so right-of-way negotiations may start and this project may be advertised for construction as soon as funds are made available.

4. An allotment of funds for acquisition of right-of-way on the preceding section, and acquiring key parcels for protection where required between San Francisco and San Mateo.

5. Surveys and design to be started in San Francisco, toward acquisition of rights-of-way, by agreement, with ½¢ Gas Tax funds for State Highways in San Francisco.

6. Request cooperation of cities and county in protection of existing set-backs, establishment of additional set-backs where required, and financial assistance in acquiring key parcels if necessary to avoid building and other improvements, where required on the entire project.

The route of the proposed freeway is as follows:

a. Third Street in San Francisco to Sierra Point.

About one-third of both the week-end and week-day travel on the Bayshore Highway south of Third Street in San Francisco enters or leaves at Third Street. The ratio of interfering traffic to through traffic movement is 30 per cent, the highest of any individual intersection on the entire project. Traffic signals, combined with street car traffic crossing the Bayshore at an acute angle, make this a point of serious delay to the main Bayshore travel.

A relocation of this route, leaving the existing road for the use of local travel, one direct relocation southerly from Third Street and across the shallow bay waters to Sierra Point, appears to be the most feasible and economical solution. The present Bayshore grade line in the vicinity of Third Street is rolling, with a peak at Third Street, making it feasible to construct an under-pass as a part of this project, which would actually start at Salinas Street for proper connection, and to make provision for complete traffic separation and access facilities to Third Street.

6-MILE SECTION

This improved alignment would have a maximum 4 per cent grade, and would represent a saving in distance of .37 mile, equivalent to more than $150,000 saving in vehicle operating costs per year, which, capitalized at 7 per cent, would justify a capital investment of some $2,200,000 from this standpoint alone.

Access to the freeway is planned for Blenken Street, and at the southerly end of the section south of Sierra Point. Two bridges have been planned for the Bay section, and another over the main line of the Southern Pacific at Sierra Point.

Length of this section is 3.8 miles.

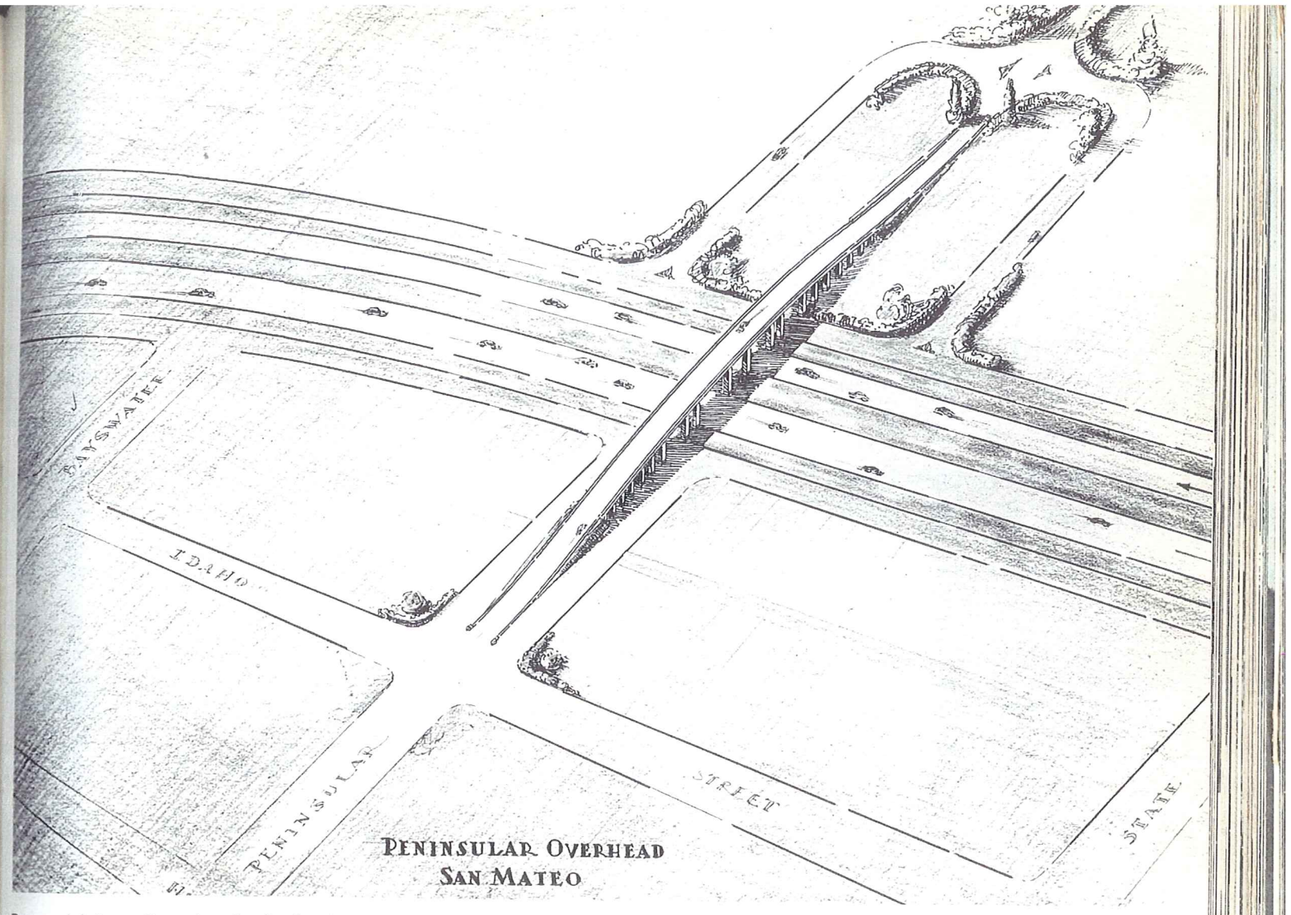
b. Sierra Point through South San Francisco.

The present highway of 40-foot paved width in a 125-ft. width of right-of-way, has been widened to curbs 100 feet wide through the city portion. This widened portion has, however, been surfaced only with a light armor coat, in contrast to the 40 feet of main heavy concrete pavement. Traffic is becoming so heavy that during peak hours it is commonly observed traveling one, and sometimes two lanes on each side of the concrete pavement, for this section.

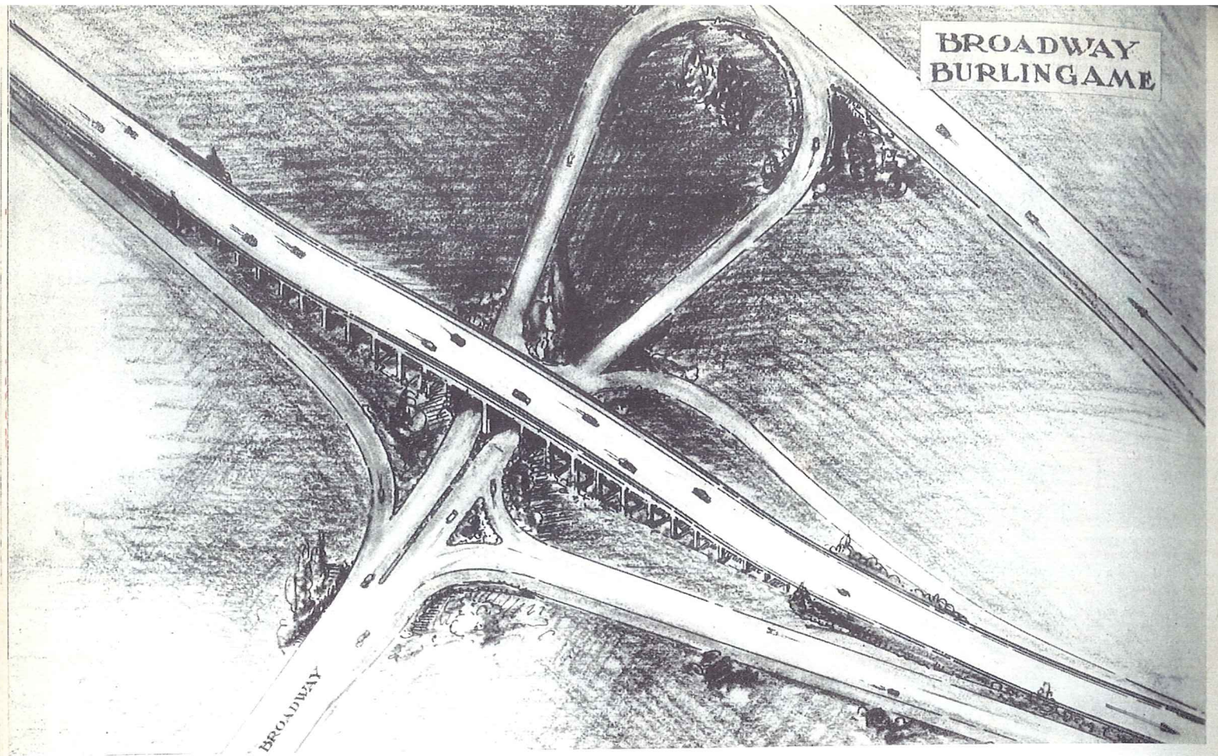
Grand Avenue, with traffic signals, and a 21 per cent conflict of interfering traffic to through traffic movement, most of which is cross-traffic, is another point of appreciable delay during peak hours of traffic, in particular, but to all traffic, in general.

The present underpass under the Southern Pacific Railroad has a 1,000-ft. radius curve, in contrast to the approximate 3,000-ft. minimum radius planned for the freeway design. It has a superelevation of only one-tenth of present standard for high-speed traffic, and an existing vertical clearance of 1.1 feet under present desirable minimum. It therefore presents a barrier for consideration in widening the existing pavement on the present alignment, in view of the grade separation which must be provided for Grand Avenue. Grand Avenue serves the large industrial point jutting eastward from South San Francisco, and is a through street which can not be ignored.

Our studies indicate that the greatest economic return and value can be obtained by widening the present highway on the easterly side, over-



Proposed intersection plan for Peninsula Avenue, San Mateo. Separated freeway lanes, overpass structure, with service and access lanes for local traffic.



One-way freeway lanes are widely separated in this sketch for the Broadway intersection at Burlingame. Cars entering or leaving the freeway would use the big loop curves providing safe connections with either lane.

passing Grand Avenue and the Southern Pacific mainline tracks with one structure east of the present underpass, reserving the latter for local entrance and exit to and from the town of South San Francisco.

As with the section preceding, a narrow, or 6-ft. minimum width of division strip between the inner freeway lanes, has been planned for this section. The existing highway pavement would continue as the outer lane serving local traffic for this section.

Access to and from the freeway is planned at the northerly city limits, at Grand Avenue and vicinity, and south of the present South City underpass, with appropriate access and separation structures.

This section is 1.8 miles in length.

c. South San Francisco Underpass to Peninsula Avenue in Burlingame.

Due to the character of the terrain this section traverses, the location of Mills Field and immediate plans for its development and others in Burlingame and San Mateo, to conserve the value of the investment in the present highway, there appears to be only one proper and logical solution for the reconstruction of this section of highway.

After due consideration of all factors involved, it is recommended this section be developed by stages to an ultimate "Freeway" design, and become the initial unit of construction.

The freeway is planned to consist of the use of the present roadway for one-way traffic, a new three-lane roadway to be constructed and separated from the present pavement by means of a 40-ft. minimum width of division strip. The division strip, with the initial construction of the new roadway, will provide immediate relief at the intersections made with San Bruno Avenue, entrance to Mills Field, Millbrae Road, Broadway, Burlingame, and Peninsula Avenue, where ultimate grade separations are planned.

This section of highway has a very high accident rate, and of these accidents almost 60 per cent are of the type which will be eliminated by the construction of dual roadways with protection at intersections. The first stage, including the channelization of these intersections, will facilitate flow of traffic and provide safety features which are lacking on the highway at the present time, although maximum freeway principle can not be realized either from traffic flow or safety until the grade separations are built.

The alignment of the new roadway is planned to parallel the westerly side of the present pavement to near Millbrae Road, thence diverging and continuing on direct course to the present connections with Broadway, Burlingame. Due to imminent development and increased future values of property on the westerly side of the Bayshore south of Broadway, Burlingame, and to provide for a very attractive and efficient entrance to Broadway, a transition is made at this point and the new roadway will be provided for by widening on the easterly side from this point to Embarcadero Avenue in Palo Alto.

Due to the existing development between Broadway, Burlingame, and Peninsula Avenue, outer lanes are planned on the westerly side of the present roadway to provide for local traffic movements between these two points.

The improvement of this section, of 6.6 miles in length, will promote and accelerate the development of the whole Peninsula area to a greater immediate extent than could be expected from the improvement of any other section as the first unit.

Cost of right of way depends upon negotiations for large holdings by the City and County of San Francisco. An allotment of $600,000 is recommended to acquire rights of way to this section and to acquire key parcels for protection at other locations where required between San Francisco and San Mateo.

d. Peninsula Avenue, Burlingame, to Main Street, Redwood City.

The present highway of this section traverses low delta land and salt marsh to Redwood City. The existing alignment is satisfactory, and except for consolidation settlement over some marsh areas, the roadbed is in good condition throughout. It is proposed to utilize the existing roadbed for future southbound traffic and to construct a new 3-lane roadway for northbound traffic on the easterly side of the present highway, separated from the existing road by a 40-ft. division strip, to permit stage development of the ultimate freeway design.

Existing property improvements and potential future development predominate on the westerly side, being the reason for widening of right of way on the bay side of the existing highway.

Ultimate grade separation structures are proposed at Third Street—San Mateo, Nineteenth Avenue—San Mateo, Ralston Avenue—Belmont, Holly Avenue—San Carlos, and Jefferson Street—Redwood City.

Present traffic conflict using these connecting roads and related trends indicated that the first separation structures should be provided for at Third St. in San Mateo and at the entrance to Redwood City, with other separations to follow as the development of the various areas requires.

Pending increased traffic volumes on these intersecting roads, provision can be readily made to channelize the dividing strip at these points and in so doing, reduce the potential accident hazard to a minimum.

The construction of outer lanes will be necessary from Peninsula Avenue to approximately Tenth Street in San Mateo, to serve local traffic in the adjacent residential and business areas.

This section is 8.7 miles in length.

e. Main Street, Redwood City, to Embarcadero Road south of Palo Alto.

This section of existing highway, 6.2 miles in length, traverses agricultural lands and existing or potential urban developments. The alignment, grade and roadway pavement is satisfactory and is readily adaptable to the same type of improvement as proposed for the preceding section.

In general, it is proposed to use the existing roadway for southbound traffic and to widen the right of way on the easterly side and construct a new 3-lane roadway for northbound traffic, separated from the existing traveled way by a 40-foot width of dividing strip. This width of dividing strip may be varied through developed areas where outer lanes are required and where complete facilities may be completed with the initial stage of construction.

Future grade separations are tentatively proposed at Chestnut Street, Redwood City; Fifth Avenue, opposite Fairoaks, each side of Dumbarton Subway, Willow Road and University Avenue, East Palo Alto, and Embar-

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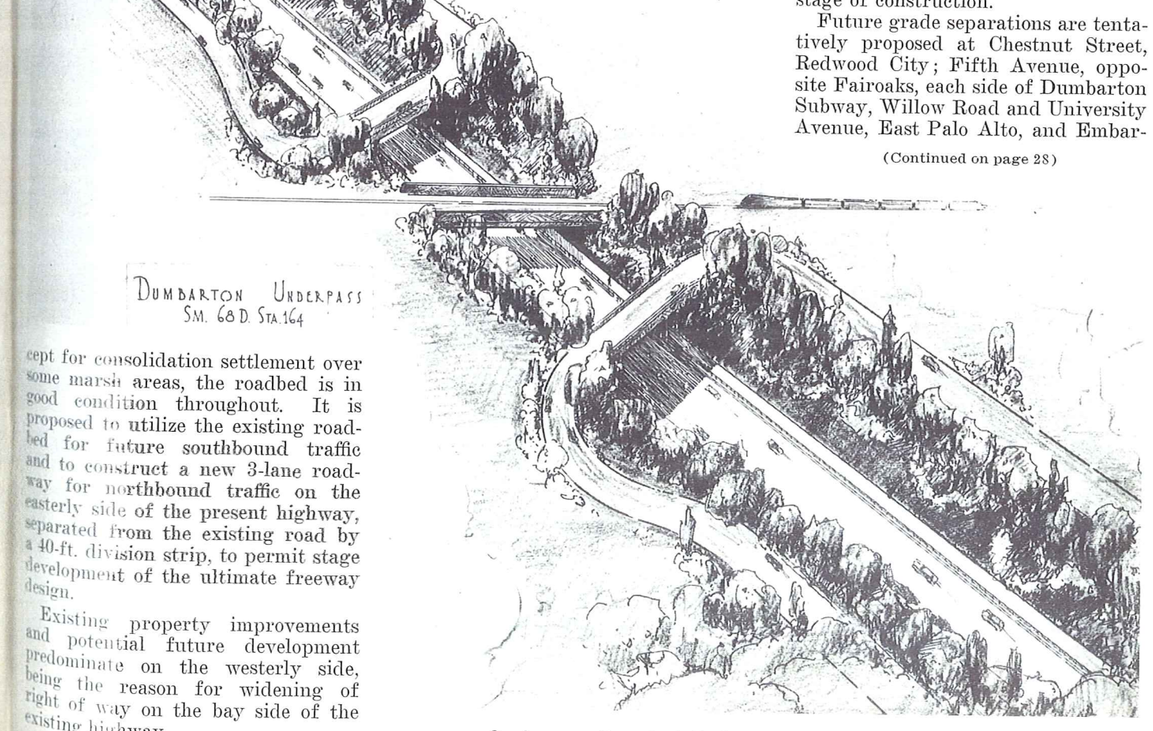

Grade separations tentatively proposed at Dumbarton Subway.